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Title: Manufacturing Management System Overview

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Los Alamos NATIONAL LABORATORY

Manufacturing Management System Overview

Presented by: ORI-2 Manufacturing Systems Team

July 12, 2021

Topics

Welcome

- *Vision/Mission/Strategy*
- *Architecture*
- *System Demonstration*
- *Vision Roadmap*
- *Questions*

Vision, Mission, and Strategy

- ***Vision***

  Institute a trusted manufacturing capability within the ALDWP Production Agency enabling digital product acceptance and access to digital manufacturing post-production activities.

- ***Mission***

  Establish a modern manufacturing infrastructure that ensures operator credentials, minimized human transcription errors, capable of managing all aspects of manufacturing including digital data acquisition, NCR resolution, and product acceptance, while providing an effective and intuitive user experience.

- ***Strategy***

  Constitute the modern manufacturing infrastructure to minimize risk and plant disruption while incrementally involving the capability.

Purpose of MMS

- ***Fundamentally change how LANL products are accepted***

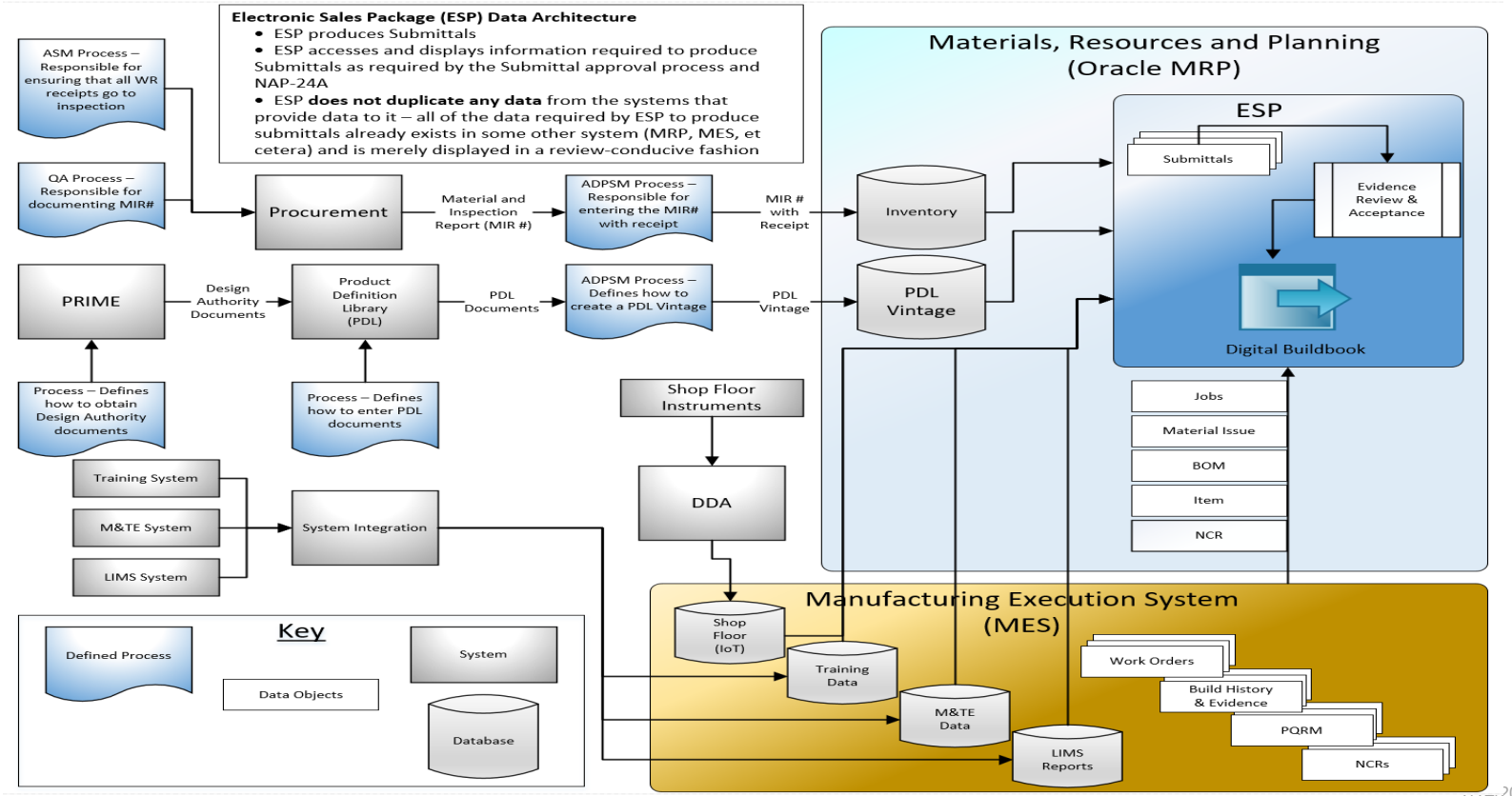
  Trusted quality evidence; no more paper Build Books

- ***Improvements to Work Execution***
  - Work Plan authoring is inclusive of quality data collection, worker qualification, M&TE, reference to work authorizing SPIs, WI, DOPs
  - Work Order (Jobs) execution captures information at each operation
  - Minimal human transcription requirements
  - NCR management and resolution integrated in MES
  - Trusted credential management integrated in MES
  - Current M&TE calibration status

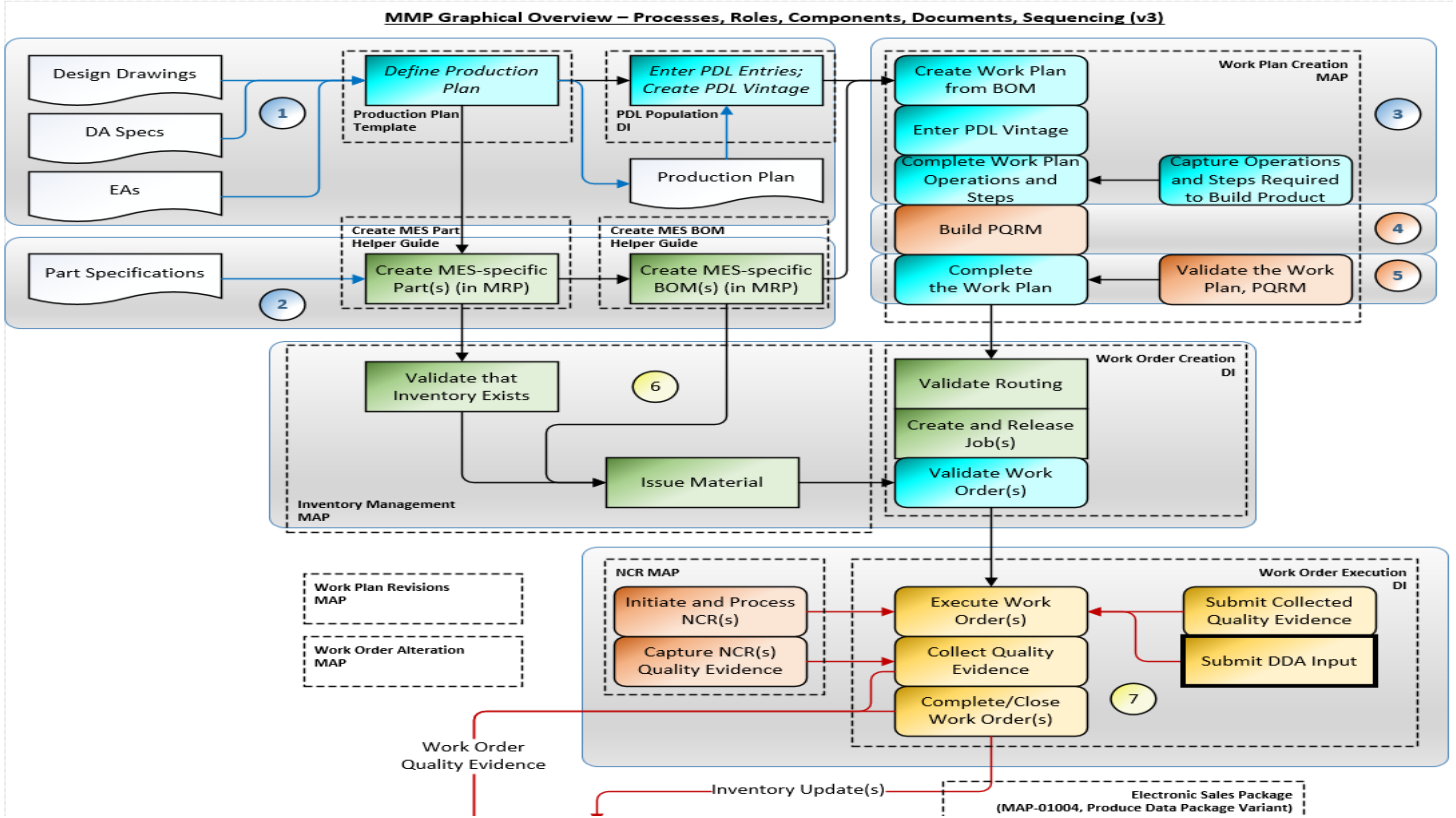
Key Components of MMS

- *Manufacturing Resource Planning System (MRP) – Oracle Component of MMS*
  - Serves as the foundation for the MMS
  - Item Masters = Part Number, Assembly Number, End Item Number
  - Bill of Material (BoM) = List of items/components required to build/assemble an end item
  - Routing = List of operations/steps required to make/assemble and item
    - Departments and Resources are identified
    - Durations and lead time are assigned
  - Discrete Job – Is created in MRP and is executed as a work order in MES
- *Manufacturing Execution System (MES) – Solumina Component of MMS*
  - Work Order (Jobs) execution captures information at each operation
  - NCR management and resolution integrated in MES, NCRs are properly dispositioned and documented
- *Digital Data Acquisition (DDA) – Custom built application*
  - Application to gather signals from measurement sources and digitizes the signals for storage, analysis, and presentation
- *Electronic Sales Package (ESP) – Custom built application*
  - Application to facilitate the presentation, certification, review and acceptance of the product data package for completed assemblies
- *Digital Build Book (BB) – Custom built application*
  - ESP extension to generate a digital copy of the product data package for archive
- *Digital Twin – (Sometimes referred to as BoM Book)* *(Not in scope for FPU)*
  - All of the data collections captured during the production processes to include quality evidence requirements from the design agency for product acceptance

MMS Architecture, Processes & Data Flow



MMP Processes, Roles, and System Interactions



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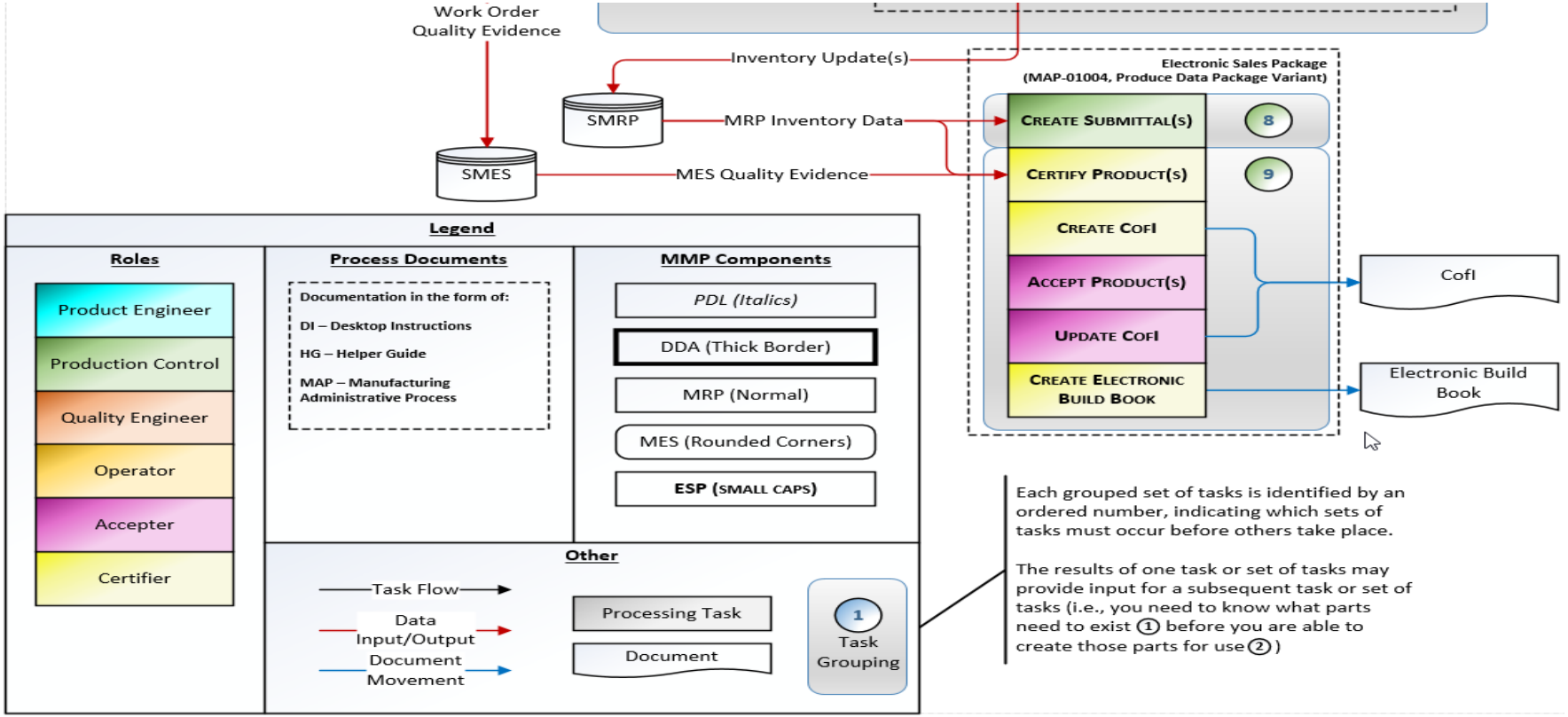
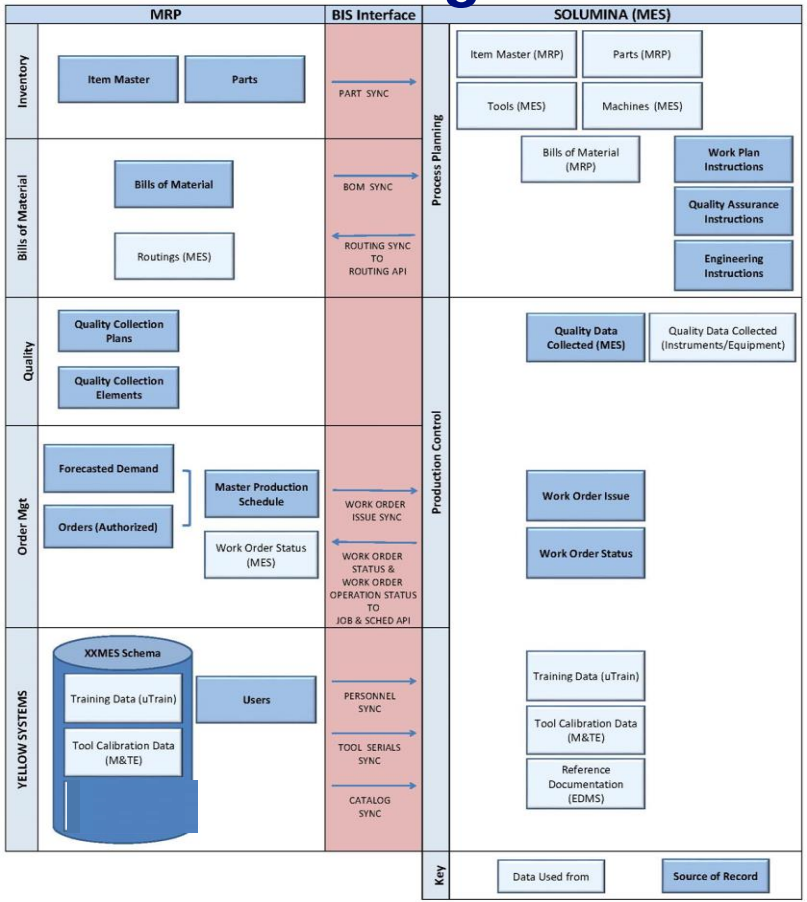


MRP/MES Integration



- ***Parts created in MRP***
  - Transfers to MES
- ***BOM created in MRP***
  - Transfers to MES
- ***Work Plan created in MES***
  - Transfers to MRP (Routing)
- ***Quality Data lives in MES***
- ***Discrete Job created in MRP***
  - Transfers to MES (Work Order)
- ***Work Order processed in MES***
  - Transfers status to MRP
- ***Training, Calibration, Reference Documentation lives in MRP***
  - Transfers to MES

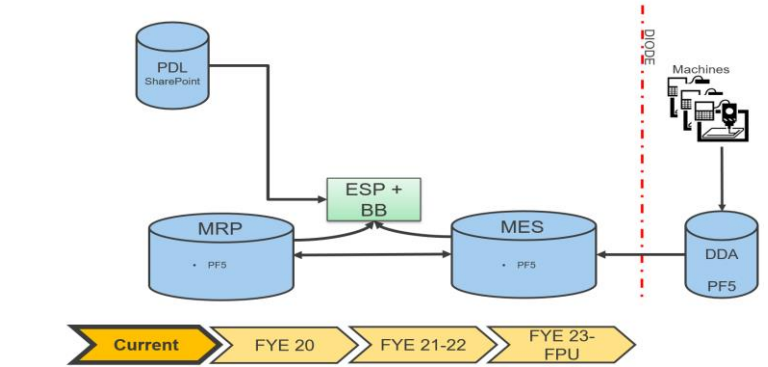
System Demo

- ***Unclassified Work Plan***
- ***Unclassified Operations in MES***
  - Elements within MES Operations
  - Calculations
  - Product Quality Requirements Mapping (PQRM)
- ***Unclassified Work Order***
  - Data collected within MES
  - Alterations
- ***Change Management***
  - Versions
- ***Electronic Sales Package (ESP) Review of Train***
  - Product Definition
  - Product Hierarchy
  - Production Data – Procedures
  - Production Data – Measuring and Test Equipment (M&TE)
  - Quality Evidence (PQRM)
- ***Build Book Review***
  - PDF of the ESP

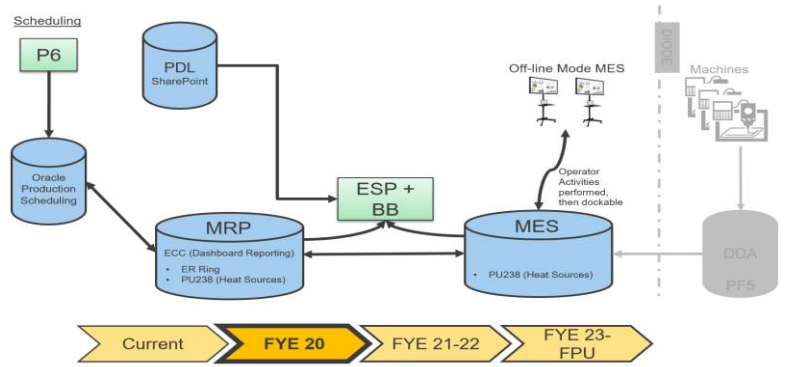
System Demonstration

Vision Roadmap

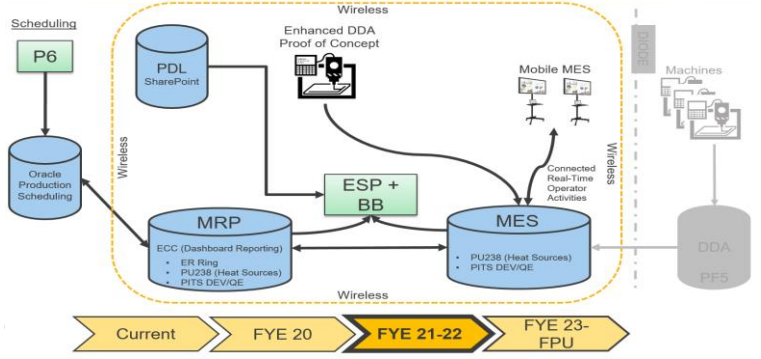
PF-5 Current Production



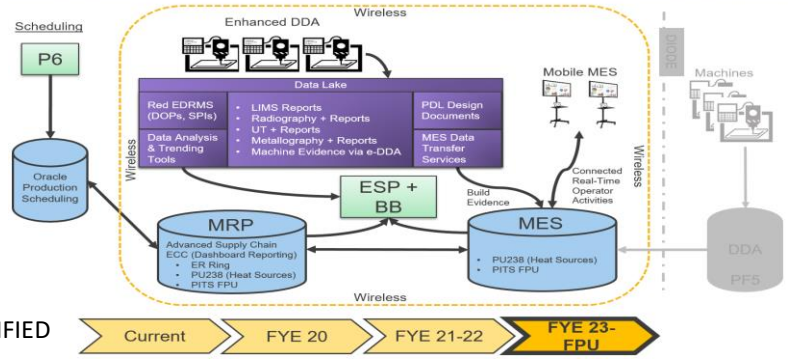
PF-4 Production Roadmap



PF-4 Production Roadmap



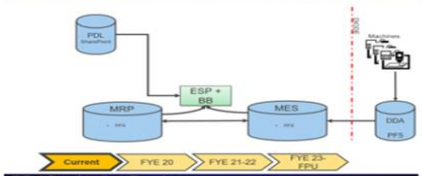
PF-4 Production Roadmap



Questions

Vision Roadmap

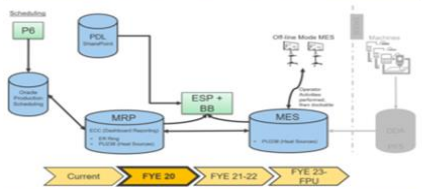
PF-5 Current Production



Reflects the components of the Manufacturing Management System (MMS) which are in use for the manufacturing, product acceptance, and sale of the Power Supply Assemblies in PF-5. The key components include:

- Oracle Manufacturing Resource Planning System (MRP)
- iBASEt Solumina Manufacturing System
- Custom developed Digital Data Acquisition (DDA) Application
- Custom Developed Electronic Sales Package (ESP)
- Custom Developed Digital Build Book (BB)

PF-4 Production Roadmap

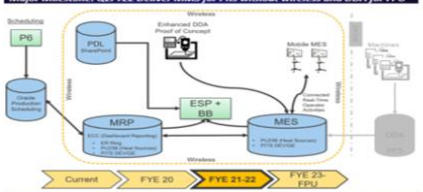


Introduction of the PF-4 Production Roadmap includes:

- Successful Installation of Oracle Production Scheduling (OPS) with integration with P6 files
- Successful deployment in PF-4 for the HSFA product line
- Introduction of the Oracle Enterprise Command Center (ECC) for enhanced reporting capability
- DDA Feasibility Study for HSFA and Pit Product Lines
- The vision of off-line mode in MES (separate project from MMP Scope)

PF-4 Production Roadmap

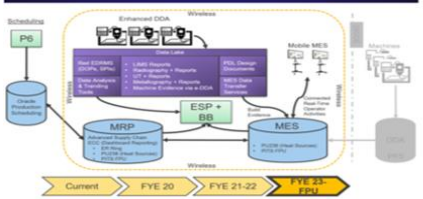
Major Milestone: Q2FY22 Deliver MMS for Pits without wireless and DDA for FPU



This portion the PF-4 Production Roadmap includes:

- Acceptance of MMS for HSFA Product Line to sell product via ESP, without DDA (Q3FY21)
- Acceptance of MMS for the Pit Product Line to sell product via ESP, without DDA (Q2FY22)
- Introduction of the Enhanced DDA Proof of Concept
- Testing of Mobile MES via tablets or other approved portable devices (dependent on wireless capability)
- Introduction of the wireless project to implement wireless capability into PF-4 (separate project from MMP scope)

PF-4 Production Roadmap



This portion of the PF-4 Roadmap takes the MMS to FPU:

- Data Lake Repository which allows access to:
  - Classified EDRMS Repository for SPIs and DOPs
  - Data Analysis and Trending Tools via Data Lake
- Fully implemented and approved wireless capability
- Real time data capture via Mobile MES capability on tablets or other approved portable devices (dependent on wireless capability)
- Continued implementation of DDA capability
- MMS System is utilized to perform product acceptance of First Production Units utilizing the ESP.